United Nations A/CONF.199/PC/18/Add.8

General Assembly

Distr.: General
24 April 2002

Original: English

Commission on Sustainable Development acting as the preparatory committee for the World Summit on Sustainable Development
Fourth session
Bali, Indonesia, 27 May-7 June 2002
Item 4 of the provisional agenda*
Multi-stakeholder dialogue segment

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Note by the Secretary-General

Addendum**

Dialogue paper by scientific and technological communities***

Science and technology as a foundation for sustainable development

Why is science and technology essential for sustainable development?

1. Sustainable development is probably the most daunting challenge that humanity has ever faced, and achieving it requires that the fundamental issues be addressed immediately at the local, regional and global levels. At all scales, the role of science and technology is crucial; scientific knowledge and appropriate technologies are central to resolving the economic, social and environmental problems that make current development paths unsustainable. Bridging the development gap between the North and the South and alleviating poverty to provide a more equitable and sustainable future for all, requires novel integrated approaches that fully incorporate existing and new scientific knowledge. The scientific and technological community can make a leading contribution to tackling the major problems identified in sections III and V of the Millennium Report of the Secretary-General (A/54/2000), "Freedom from want" and "Sustaining our future". Those issues include: (a) fighting against disease; (b) population growth and urbanization; (c) the digital/information divide; (d) coping with climate change; (e) confronting the water crisis; (f) defending

* A/CONF.199/PC/15.

** The document was submitted late to the conference services without the explanation required under paragraph 8 of General Assembly resolution 53/208 B, by which the Assembly decided that, if a report is submitted late, the reason should be included in a footnote to the document.

*** Prepared by the International Council for Science (ICSU) and the World Federation of Engineering Organizations (WFEO); the present document has been prepared in consultation with the InterAcademy Panel (IAP) the Third World Academy of Sciences (TWAS) and the International Social Sciences Council (ICCS); the views and opinions expressed do not necessarily represent those of the United Nations.

02-35282 (E) 010502

the soil; (g) preserving forests, fisheries and biodiversity and (h) building a new ethic of global stewardship. Whatever the cultural, geographical, socio-economic and environmental setting, a strong partnership between the scientific and technological community and other members of civil society, the private sector and Governments is a fundamental prerequisite for sustainable development.

How can the various scientific and technological communities improve their contributions to sustainable development?

2. Implementing Agenda 21 during the next decade and beyond will build on progress made during the past 10 years in generating knowledge targeted to sustainable development objectives and in developing cleaner and more affordable technologies. However, enhancing the scientific and technological community's capacity to contribute to sustainable development will require significant changes. The scientific and technological community is committed to implementing necessary changes and developing appropriate partnerships. Those changes include:

(a) *More policy relevant science.* A much greater share of research must integrate problem-oriented and interdisciplinary research that addresses the social, economic and environmental pillars of sustainable development. Good science is essential for good governance;

(b) *Broad-based, participatory approaches.* Traditional divides between the natural, social, economic and engineering sciences and other major stakeholders must be bridged. Research agendas must be defined through broad-based, participatory approaches involving those in need of scientific information. The scientific and technological community accepts its responsibility to improve cooperation with other parts of civil society, the private sector, Governments and intergovernmental bodies;

(c) *Promoting gender equality in science.* Historically, women have been severely underrepresented in science. The scientific and technological community will actively promote gender equality in science and work with women and organizations (e.g., Third World Organization for Women in Science) to eliminate existing barriers.

New contract between science and technology and society for sustainable development

3. The basic changes outlined above are essential for redirecting the present global scientific and technological system towards the sustainable development challenge. However, it is now clearer than ever that that challenge has so far outstripped the capacities both of the scientific and technological community and of society to forge effective and comprehensive responses. Nothing less than a new contract between the scientific and technological community and society is required.

4. The following are crucial components of such a new contract:

(a) *Improving education and capacity-building.* Enhanced science teaching at both the primary and secondary levels is central to scientific and technological capacity-building and to a better public understanding of sustainable development issues. A further target should be to increase the percentage of university-level students enrolled in science, mathematics and engineering. Current enrolments are decreasing in most developed and developing countries. Three core components are critical in enhancing capacity: skilled individuals, efficient institutions and active networks. Capacity-building at the international, regional and subregional levels must be given increased attention since it is often the most cost-efficient way to build a critical mass of scientific and technological capacity;

(b) *Bridging the North-South divide in scientific and technological capacity.* Although it is necessary to build and enhance strong scientific and technological capacity in all regions of the world, that need is particularly pressing in developing countries. The Organisation for Economic Cooperation and Development countries spend more annually on research and development than the economic output of the world's 61 least developed countries. Developed countries employ 12 times the per capita number of scientists and engineers in research and development than developing countries, where there is woefully weak institutional scientific and technological capacity. Ten years after the United Nations Conference on Environment and Development, that challenge remains a major obstacle to sustainable development. Developing countries must address that problem and enhance significantly investment in higher education

and scientific and technological capacity. The developed countries must accept their responsibility for much improved knowledge and technology-sharing. Bilateral donors and other funding mechanisms should substantially increase the funds they allocate to science and technology for sustainable development, especially in the area of scientific and technological capacity-building;

(c) *Clean technologies and sustainable production and consumption patterns.* The public and private funding of science and technology, in developed and developing countries alike, must focus on developing new clean technologies and supporting sustainable production systems and consumption patterns. There should also be improved international sharing and local adaptation of clean and/or traditional technologies. In many instances, traditional technologies offer viable solutions. Due emphasis should be placed, whenever appropriate, on local, culturally adapted and low-cost technologies;

(d) *Governance for sustainable development.* Governance systems for sustainable development at the local, national, regional and global levels must incorporate the best available scientific and technological knowledge. The link between the scientific and technological community and decision-making is poorly supported by current institutional structures. Existing governance institutions and institutional mechanisms need to be transformed in ways which ensure scientific and technological input; if necessary, new mechanisms should be developed to meet that explicit goal. The tool of integrated scientific and technological assessments needs to be bolstered and enhanced at the national, regional and global levels. It is proposed that a formal link be established between the Commission on Sustainable Development and the organizing partners of the multi-stakeholder dialogue segment for the scientific and technological community (ICSU and WFEO), for example through a scientific and technological advisory panel, which would be a mechanism to ensure that the Commission can draw upon independent scientific and technological expertise and advice;

(e) *Long-term perspectives and data needs.* The scientific and technological community has a responsibility to provide the knowledge and technologies that will enable a long-term sustainable future. To that end, a basic requisite will be to establish long-term monitoring systems for collecting reliable scientific, socio-economic and other societal data. Those systems must permit the integration of all relevant data sets for addressing crucial sustainability issues. The global environmental observation systems need to be made fully operational, which requires governmental funding. Full and open access to scientific information data must be ensured;

(f) *Augmenting financial resources for science and technology for sustainable development.* Current levels of investment in science and technology for sustainable development are far too low in both developed and developing countries. That is true both with respect to the scope of the problems and with respect to the promising rate of return on scientific and technological investments. Larger investments in science and technology should be seen primarily as increased investment in a country's socio-economic development and in preserving natural life-support systems for current and future generations, rather than simply as research expenditures. For that reason, public sector funding for scientific and technological activities targeted on sustainable development goals should be augmented significantly in both the North and the South. The private sector should reorient its scientific and technological investments in a manner that integrates sustainable development objectives and should increase its scientific and technological investments generally. Strategic partnerships should be forged between the public and private scientific and technological sectors at the national and regional levels.

Specific new partnership initiatives

The scientific and technological community has taken the initiative to launch several new partnership initiatives geared towards implementing important recommendations in a number of Agenda 21 chapters. The participation of other partners is sought in those initiatives, as appropriate. In particular:

- *Science and technology for sustainable development.* The current global change

programmes[1] provide an important platform for the development of scientific endeavours addressing key issues related to sustainable development. Within the next few years, initiatives will be launched that address all three pillars of sustainable development in a more integrated way. The aim is to develop such interdisciplinary science programmes to address key sustainable development issues in a participatory fashion, engaging other dialogue partners as well as the engineering community;

- *International scientific and technological capacity-building.* Several capacity-building programmes will be launched with various partners. Examples of specific initiatives include: (a) a capacity-building programme for addressing crucial freshwater problems. Training activities will range from relevant basic sciences to training in interdisciplinary approaches; including the social sciences. The lead partners are UNESCO, ICSU and TWAS; (b) an initiative on mathematics and science teaching based on current ICSU-IAP collaboration. The involvement of youth and labour unions major groups will be sought; (c) a decadal plan for capacity-building for global change science,[2] calling for support of a broad-based capacity-building programme in global change research for developing countries;

- *The Role of Food Security in Sustainable Development.* Food security is an essential component of sustainable development, especially for developing countries. ICSU will launch a global environmental change and food systems programme. Possible partners include IAP, the Food and Agriculture Organization of the United Nations and the farmers and women major groups;

- *Health as an integral component of sustainable development.* Major research initiatives are already under way to address the scourge of infectious diseases that is the major cause of morbidity and premature mortality in developing countries. The scientific and technological community is fully committed to these initiatives. In addition, the scientific and technological community is committed to the integrating human health research with all three pillars of sustainable development. For example, ICSU global change programmes are initiating a partnership with the World Health Organization and the Inter-Academy Medical Panel focused on environment and health;

- *Blending traditional and scientific knowledge for sustainable development.* ICSU and UNESCO, in collaboration with the indigenous people and business and industry major groups, will develop a new initiative for the conservation and sustainable use of natural resources based on traditional knowledge. TWAS activities on indigenous medicinal and food plants could provide additional links to the scientific and technological community in developing countries. Planning of activities and targets to be achieved will initially be for five years;

- *Demonstrating applications of the global environmental observing systems.* ICSU, its relevant interdisciplinary programmes, UNESCO and the other United Nations system agencies are co-sponsoring the Global Observing System. The focus should now be on making that system operational and the applications of the global environmental observing systems for enhancing integrated approaches to sustainable natural resource management.

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[1] DIVERSITAS (sponsored by ICSU and three of its subsidiary bodies plus the United Nations Educational, Scientific and Cultural Organization (UNESCO)); the International Geosphere-Biosphere Programme: A Study of Global Change (ICSU); the International Human Dimensions Programme (ICSU and ISSC); and the World Climate Research Programme (ICSU, the Intergovernmental Oceanographic Commission and the World Meteorological Organization).

[2] The International START Secretariat (the Global Change System for Analysis, Research and Training) of International Geosphere Biosphere Programme (IGBP), IHDP and World Climate Research Programme (WCRP), the International Foundation for Science and the Third World Academy of Sciences.